New Directions in Research on Information Requirements Analysis: The Language Connection

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Abstract: This paper outlines the basic theoretical assumptions of language analysis and then proposes a new approach called discourse analysis. The theoretical foundations of discourse analysis are Wittgenstein's theory of language games and Habermas social action types. It has potential applications to information requirements analysis and research in organizational theory.

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Computing Reviews Category: D.2.1, K.6.1, K.6.3

1. Introduction

Information requirements analysis (IRA) has always been a critical and highly risky task in information systems development. A fairly recent contribution to the wide variety of approaches already available to IRA is language analysis. The purpose of this presentation is to outline the increasing sophistication of various language analysis approaches to IRA from "fact-based" to "rule-based" approaches. The latter include speech act and language games analysis. The emphasis of this presentation is on describing the fundamental assumptions which characterize alternative language analysis approaches to IRA and speak to their limits.

Language analysis is not being advocated as simply another panacea. In deciding whether language analysis should be used, the complexity and resource demands of the approach needs to be matched to the complexity of the situation at hand. However, it should be kept in mind that in the past the complexity of so-called "clerical" office tasks has often been underestimated resulting in oversimplification and organizational implementation difficulties.

2. Background of Language Analysis

The basic idea of language analysis is to focus on the meanings conveyed by the users through their use of language "to get their jobs done" [3,5]. Alternative approaches to language analysis can be distinguished by relating to the controversy between objectivist and interpretive conceptions of information and knowledge (epistemologies) leading to the distinction between fact-based and rule-base approaches [7]. Fact-based approaches subscribe to the positivist notion of a reliable, empirical base of observations which can be expressed in an unambiguous language the expressions of which correspond to given states of affairs. Rule-based approaches focus on the inherent ambiguity of language and the creation of shared

meanings. Meanings emerge through language use and novel language usages affect the process by which meanings are discovered and become socially accepted.

Rule-based approaches to information systems development have been influenced by two theoretical positions: hermeneutics and post-Wittgenstein language theory, in particular speech act theory which derives meaning from recognizing the human intentions pursued with language use. They therefore share the weaknesses along with strengths of these philosophical schools. Hermeneutics presumes that our understanding of a "text" is improved through repetitive readings which interpret its details in terms of one's pre-understanding of the whole and the whole in terms of the details (e.g. [4]). While classical language theory was structuralist, in recent research post-structuralist (or emergent) language theories have received growing attention [8]. The post-structuralist theory of language is closely related to emergent systems theory, because organizations may be seen as the shared images which emerge from a series of loosely connected, partly concurrent and partly sequential narratives, i.e. stories or conversations through which organizational actors make sense of their work and their roles in the organization [11]. By extracting and analyzing the meanings conveyed through conversations about the work, information requirements can be identified and described.

3. Principles of Discourse Analysis

Based on this view of the nature of organizational "reality", I propose a refinement of conversation analysis called discourse analysis both as a research tool and method of requirements determination. Just as is the case with conversation analysis, discourse analysis does not pretend to give an objective account of events, because it focuses on people's own interpretations. However, it gives clearer guidelines than conversation analysis to the researcher for the collection and interpretation of records without imposing an a-priori scheme or dictionary like content analysis. In discourse analysis both the unit of analysis and the content variables defining the coding scheme evolve during the interpretation and analysis of the collected records. This makes it different from speech act analysis which is rule-based, but the rules are supposedly fixed. They are the a priori for extracting the meaning from speech by relating each unit of speech, the speech act, to specific human intentions [9]. Examples of typical speech acts are making a claim to truth (assertion), making a commitment (promise) or creating a new state of affairs (declaration).

In order to interpret the linguistic records, a coding scheme from a prior application of language analysis was used as a starting point (cf. the draft version shown in figure 1). The vertical dimension of the coding scheme is based on the theory of language games as summarized by [1] and Andersen and Holmqvist [2]. They were modified during multiple cycles of interpretations so that its categories would better capture the phenomena of importance for this study. About 20 % of the categories were affected by this.

As systems development is not only a sense making but also a goal oriented activity in the eyes of the participants, this provided the justification for refining the coding scheme further by relating its categories to a generic taxonomy of social action. Hence a second dimension was added to the language game classification obtained by modifying Andersen and Holmqvist prior work. The categories of the coding scheme's horizontal dimension was taken from the social action typology proposed by Habermas [6] in his Theory of Communicative Action. We did not find it necessary to change these categories. This yields a two-dimensional coding scheme of content variables which made it possible to interpret the linguistic data at two levels: the level of single units of speech (speech acts) and the level of grouping speech acts into sequences which express human intentions that transcend one speech act and often persist as a unifying theme between different meetings.

4. Some Results

Through an action research project with a small arts organization engaged in defining their strategic mission and opportunities, we gained access to the planning meetings of their executive officers. Data about the social actions observed during a six month strategic planning exercise were collected. This included not only transcripts of what was said from tape recordings and researcher's field notes, but also the interpretations from the perspective of the participants. The latter were gleaned from diaries kept by the participants and confidentially shared with the researcher. These multiple records allow us to

cross-check interpretations through iterative "hermeneutic circles" (which must not be confused with a positivistic validity test). A simple frequency count of the meanings coded in this way is presented in figure 2.

Because of the goal oriented nature of the planning task it was expected that most of the language meanings would be related to instrumental or strategic action. The overwhelming dominance of communicative action (oriented to reaching agreement) and the preponderance of comments aimed at clarifications and evidence giving as is evident from figure 2, was very surprising.

5. Conclusions

The immediate implication of our research is that Winograd's and Flores' [12] contention that commitments are the most important aspect of management communication must be viewed with a great deal of scepticism. Our data suggest that sense making is at the core of management and computer support of cooperative work needs to support the shared sense making and consensus formation.

From a broader perspective this research is significant in two ways. First our approach allows us to shed some light on the controversy whether structuralist or emergent views of the organization are more appropriate. This is on the assumption that communicative action is the process through which organizations rebuild themselves while pursuing their purported missions. The answer to the question whether a structural or emergent theory is more adequate (both are only approximations and therefore neither should be expected to fully explain the complexities of organizational life) has important practical implications for the preferred approach to information systems development [10].

Second, the research contributes to the methodology of action research. One widely perceived problem with action research is lack of generalizeablity and commensurability: how can different action research projects contribute to one common theoretical understanding? Our research provides an example for the interpretation of data collected from action research that is more systematic and allows modest forms of generalizations by making the results of two or more action research projects better comparable than has commonly been achieved in the literature. Yet the approach does not undermine the strength of action research, namely the recognition of the uniqueness of each problem situation and its setting which can only be grasped through idiographic descriptions and interpretations.

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Habermas' Action Types / Andersen's Work Language Games		Teleological Action (Oriented to success)		Socially Mediated & Oriented to Understanding			
		(Toward Objects) Instrumental Action (IA)	(Toward Others) Strategic Action (SA)	Communicative Action (CA)	Discursive Action (DA)	Normatively Regulated Action (NRA)	Dramaturgical Action (EA)
I. Games establishing or changing the work organization	1.1 Defining tasks						
	1.2 Ordering						
	1.3 Work Distribution						
	1.4 Work Coordination						
	1.5 Work Priority						
	1.6 Help						
	1.7 Control Check						
	1.8 Supervision						
	1.9 Reporting						
	Requests for clarification						
II. Games related to the task	2.1 Problem Identifying						
	2.2 Data interpretation						
	2.3 Sub-goal formation						
	2.4 Problem solving						
III. Games reproducing social relations and knowledge	3.1 Instruction						
	3.2 Talk-in-the-work						
	3.3 Greetings						
	3.4 Comments						
	3.5 Exclamations						
IV. Machinery and tools	4.1 Requesting tools						
	4.2 Warnings						

Figure 1 Coding scheme

Truex's Adaptation of the Holmqvist and Andersen Work Language Typology

Work Language Type		Characteristics
Games establishing or changing the organization of Work	1.1 Defining Tasks *	*activities aimed at determining the appropriate task and the order of performance of tasks*
	1.2 Ordering	aims at allocating tasks to employees
	1.3 Work Distribution	aims at dividing a taskor set of tasks among several persons
	1.4 Work Coordination	aims at coordinating workers with the same tasks
	1.5 Work Priority	aims at changing priority so that one task preceeded another
	1.6 Help	when one worker asks another to take over a task for which he is better qualified
	1.7 Control	aims at verifying that the task is carried out correctly and in the manner ordered
	1.8 Supervision	aims at controlling the manner and speeed of the work
	1.9 Reporting	aims at informing persons about the current state of the work-*often given in response to ¶1.10 and ¶3.4 below*
	1.10 Requests for Clarification *	*used when assistance is needed to understand the task or interpret instructions or work methods; not used as ¶1.6.*
Games related to the Task	2.1 Problem Identifying *	*activities aimed at problem identification , formation and recognition*
	2.2 Data Interpretation *	*activities in the task at hand devoted towards interpretating data and making it understandable*
	2.3 Sub-goal Formation *	*activities aimed at partitioning a problem, decomposition of the goal or procedures used to accomplish a goal*
	2.4 Problem Solving	Often refers to a one-time or non recurring situation. Not the same as ¶ 3.1. Attempts to clarify and synthesize.
Games reproducing social relations, common knowledge and solidarity	3.1 Instruction	aims at giving knowledge about tasks or work organization. Tends to be repetitive and learning oriented.
	3.2 Talk-in-the-work	talk that serves to reproduce common knowqledge and social relations. *Often in the form of stories and analogies, or jokes. A means of conflict avoidance.*
	3.3 Greetings	reproduces social relations; keeps communication open.
	3.4 Comments	*Often serves as a signal to agreement/disagreement. Laughter. Statements of opinion.*
	3.5 Exclamations	outlets for emotions and often used to signal others about work progress

Adapted from: Holmqvist and Andersen. Note: significant alterations and additions to the original typology are indicated in italic type and by the asterik in col #2.

Legend to figure 1

Summary of Habermas's Action Types			
Action Type		**Attitude towards people/nature**	**Focus**
Teleological Action Oriented towards success	Instrumental Action	People treated as if they were objects and means to ends	Getting the job done
	Strategic Action	People seen as intelligent actors capable of strategic responses, maneuvering, resistance and counter action. The goal is to influence and acheive given ends.	Prediction and control. Influencing actors to get the job done.
Socially Mediated Action Oriented towards understanding Requires a communication partner	Communicative Action	People are seen as fellow humans. The goal is to acheive understanding and consensus of all actors.	Sense-making and understanding
	Normatively Regulated Action	Looks to a world of shared norms. Appeals to 'rightness', tradition, history, shared values, rules or norms.	Understanding through appeal to shared norms
	Discursive Action	Challenges warrants and claims. Others seen as intellegent opponents. Still seeking understanding and aggreement.	Clarification and justification
	Expressive Action	More internal. Revealing the feelings and inner condition. Often a signal to the outside world.	Expression of fear, joy, frustration and the full range of human emotion.

Legend to figure 1

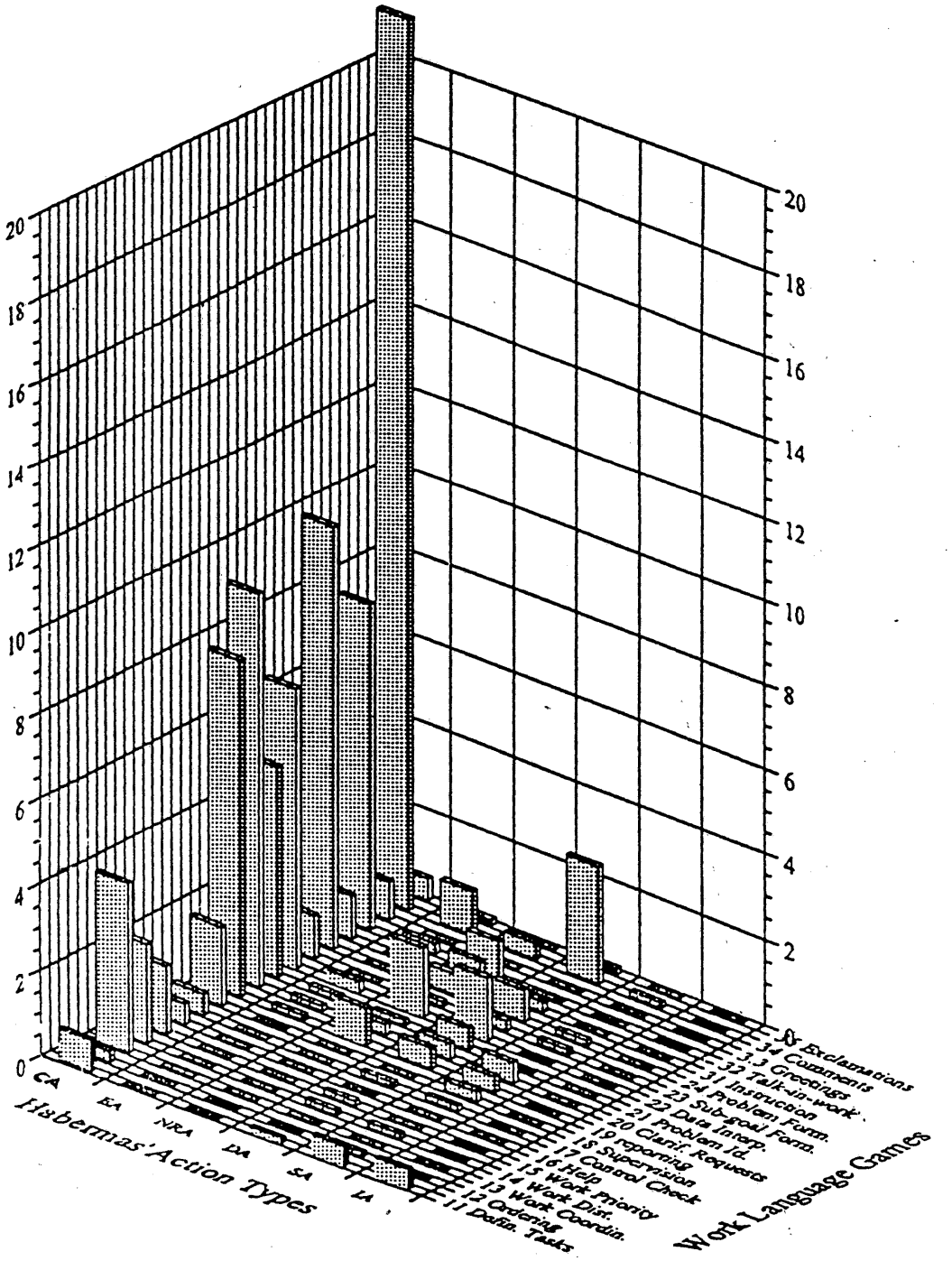

Figure 2 All text occurrences as a percent of the total number of occurrences